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PTO 03-[5529]

Japanese Patent

Sho 61-205119

METHOD FOR FILLING FOAMING BODY

[Happotai No Juten Hoho]

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UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant : Toyota Motor Corporation
Asahi Chemical Industry Co., Ltd.

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English Title : METHOD FOR FILLING FOAMING BODY

Specification

1. Title of the invention

Method for Filling Foaming Body

2. Claims

1. A method for filling a foaming body, characterized by the fact that foaming synthetic resin particles are supplied and foamed into a space in a structure.

2. The method for filling a foaming body of Claim 1, characterized by the fact that the foaming synthetic resin particles are expanded in a normal-temperature atmosphere.

3. A method for filling a foaming body, characterized by the fact that a foaming synthetic resin particle-shaped contracting body which is contracted after being formed and has a re-expansion characteristic in a normal-temperature atmosphere is supplied and foamed into a space in a structure.

4. The method for filling a foaming body of Claim 3, characterized by the fact that a foaming synthetic resin particle-shaped contracting body is manufactured and stored in

¹ Numbers in the margin indicate pagination in the foreign text.

an airtight state; a netted bag which has a shape corresponding to the shape of the internal space of the structure, into which the foaming body is to be filled, and has a mesh smaller than the particle diameter of the above-mentioned particle-shaped contracting body are arranged in advance in the above-mentioned space; the above-mentioned particle-shaped contracting body is supplied to the above-mentioned netted bag and held in a normal-temperature gas, so that the above-mentioned particle-shaped contracted body is re-expanded.

3. Detailed explanation of the invention

(Industrial application field)

The present invention pertains to a method for foaming and filling a solid resin material, which can be bead-foamed, into an internal space of a structure.

(Prior art)

In general, a foaming body is filled into a space of a structure such as body of an automobile to lower noises or to absorb vibrations inside pillar, roof, locker, and wheel house. As a method for filing such a foaming body, a method that fills a foaming body such as slab urethane foam molded in advance by a separate process into an internal space of a structure and a method that injects and foams a liquid foaming material into the

internal space of a structure are mentioned. In the former method, it is difficult to match the shape of the foaming body molded by a separate process and the internal shape of the structure, and a gap is generated between the foaming body and/2 the structure, so that the soundproof and vibration-proof effect is lowered. In the latter method, in case the liquid foaming material is injected and foamed in the field, since the liquid foaming material is leaked from the gap of a pillar part of the structure such as automobile body to which a spot welding is not applied, a hole for wiring, or an electrodeposited paint extracting hole, it is necessary to seal the other gaps in advance, leaving the part to which the air escapes during foaming, so that the work efficiency is lowered.

In order to solve this problem, a method for filling a foaming body (see Japanese Kokai Patent Application No. Sho 59[1974]-214628) as shown in Figure 2 is proposed. In this method, a bag 6 made of rubber, etc., with an elasticity is inserted into an internal space 5 of a center pillar of a structure member 1 such as an automobile in which two sheets of plate materials 2 and 3 bent by a press molding are attached to each other by a spot welding 4. Next, an injection nozzle 7a of an injection machine 7 for injecting a foaming raw liquid from a

hole 3a bored in the above-mentioned plate material 3 is inserted, and a prescribed amount of foaming raw liquid is injected from an injection port 6a of the above-mentioned bag 6.

With the above-mentioned operation, since the foaming raw liquid injected into the bag 6 is immediately foamed, filled into the internal space 5 of the structure member 1 such as pillar, and solidified in a space shape, the liquid can also be simply filled without requiring a labor to seal the structure member.

Also, as the foaming body, a polyurethane foam can be mentioned as a representative example. As a method for molding the polyurethane foam, a polyisocyanate liquid is sealed into a bomb 8 of Figure 2, and a mixed liquid of polyol, foaming agent, catalyst, surfactant, etc., is sealed into the bomb 9. Two liquid of the bombs 8 and 9 are guided to the above-mentioned injection nozzle 7a by hoses 10 and 10 and mixed and injected by the injection nozzle 7a.

(Problems to be solved by the invention)

However, according to the above-mentioned conventional method for filling a foaming body, there are the following problems.

First, the leak of a foaming raw liquid from the gap or hole of the plate materials 2 and 3 of the structure member 1

can be prevented, however when the injection nozzle 7a of the injection machine 7 is inserted from the hole 3a of the plate material 3 and the foaming raw liquid is injected into the bag 6 in the internal space 5, since the liquid is used, the car inside, pillar surface, etc., are contaminated by the drops of the raw liquid from the injection nozzle 7a.

Also, since the polyisocyanate liquid and the mixed liquid must be mixed right before foaming to inject and foam the foaming raw liquid such as polyurethane into the bag 6, and for this reason, large-scale apparatuses such as bombs 8 and 9 and hoses 10 are required. A wide work site must be secured to install them.

Furthermore, for the control and handling of the foaming raw liquid, since the liquid is stored at high pressure and the reaction is oversensitive in an atmosphere, mechanical and chemical knowledge are considerably required, and workers are limited.

The purpose of the present invention is to maintain the beautiful appearance of a structure by using a particle-shaped foaming raw agent, which does not contaminate the surroundings and vicinity by leaking to the outside of a structure, unlike a liquid foaming material, to simplify the work contents of a filling work, and to improve the workability.

(Means to solve the problems)

In order to achieve the above-mentioned purpose, as a first feature of the method for filling a foaming body of the present invention, without using a liquid foaming materials such as polyurethane foam, a resin which can be bead-foamed, for example, polystyrene, polyethylene, polypropylene, etc., is filled into a structure and foamed by applying a prescribed pressure and heating a vapor.

Furthermore, more preferably, a foaming synthetic resin particle-shaped contracting body with an expansion characteristic in a normal-temperature atmosphere is filled into a structure and held and foamed in a normal-temperature atmosphere.

As a second feature of the method for filling a foaming body of the present invention, a foaming synthetic resin particle-shaped contracting body which is contracted after being foamed and has a re-expansion characteristic in a normal-temperature atmosphere is supplied and foamed in an internal space of a structure. Furthermore, more preferably, a foaming synthetic resin particle-shaped contracting body is

manufactured and stored in an airtight state, and a netted bag which has a shape corresponding to the shape of the internal space of the structure, into which the foaming body is to be filled, and has a mesh smaller than the particle diameter of the above-mentioned particle-shaped contracting body are arranged in advance in the above-mentioned space. Then, the above-mentioned particle-shaped contracting body is supplied to the above-mentioned netted bag and held in a normal-temperature gas, so that the above-mentioned particle-shaped contracted body is re-expanded.

Here, the foaming synthetic resin particles and the foaming synthetic resin particle-shaped contracting body do not indicate only the particles, and any shape such as spherical chip may be adopted as long as it can has a size that can be easily supplied into the space of a structure.

(Operation)

In the above-mentioned first invention, since the foaming synthetic resin particles are supplied to a structure, it is not necessary to devise a leak prevention means of a bag with contractibility such as rubber, unlike a liquid foaming material, and the foaming material can be supplied to the structure.

In the above-mentioned second invention, as the foaming synthetic resin contracting body with a re-expansion characteristic, foaming synthetic resin particles (for example, Japanese Patent Application No. Sho 59[1984]-215164) in which 0.15 gr mole volatile organic foaming agent is included in 100 gr acrylonitrile-styrene copolymer resin (AS resin) is used. The reason why the foaming synthetic resin particle-shaped contracting body is held in an airtight state such as a bag made of polyvinylidene chloride (PVDC) is that the foaming synthetic resin particle-shaped contracting body is heated by contacting with vapor, foamed at a foaming magnitude of about 200 times, contracted up to about 50 times at a time of extraction into the air, immediately starts to be re-expanded by holding it as it is in the air, and re-foamed at about 200 times.

The reason why the above-mentioned foaming particles have a particle shape is that the particles are foamed at a uniform density in the internal space of a structure such as pillar of an automobile by the formation of the particle shape.

Also, the reason why the particle-shaped foaming contracting body is supplied to the netted bag disposed in advance in the internal space of the structure is that even if the particle-shaped foaming contracting body is overflowed and foamed to the outside of the structure, it is not attached to

the surface, etc., unlike conventional liquid polyurethane raw agents, however a labor to clean the surroundings after the completion of the work is omitted. Also, the reason for the net shape is that since the above-mentioned foaming raw agent is not foamed in an airtight state, it is necessary to contact it to the atmosphere. Therefore, from a viewpoint of the above two points, for example, for the above-mentioned foaming AS resin particles, the size of the mesh of the netted bag is set to be smaller than the particle diameter of the particle-shaped contracting body that is contracted up to about 50 times and airtightly stored.

With the above operation, according to the method for filling a foaming body of the present invention, the foaming contracting body is not likely to be leaked from the internal space of the structure to be filled with the foaming body, and even if the foaming body is overflowed to the surrounding, since it is not attached to the surface, its beautiful appearance is maintained. Also, since the foaming body is re-expanded in a normal-temperature atmosphere, the filling work is simply carried out, so that the workability can also be improved.

(Application example)

A detailed application example of the above-mentioned method for filling a foaming body is explained in below.

Figure 1 is a partial oblique view for explaining an application example of the present invention, and in this application example, the case where a foaming body is filled into a center pillar of an automobile is mentioned as an example.

In the figure, in a center pillar 11 of an automobile, two sheets of plate materials 12 and 13 bent by press molding, etc., are attached to each other and integrated by a fixing means 14 such as spot welding. In the center pillar 14, an internal space 15 is formed.

The process for filling a foaming body into the center pillar 14 with the above-mentioned structure is explained.

First, in the manufacture of a particle-shaped foaming contracting body, according to the manufacturing method described in application examples of Japanese Patent Application No. Sho 59[1984]-215164, a foaming contracting body made of a styrene-acrylonitrile resin was obtained. Since the foaming contracting body is re-expanded in a normal-temperature atmosphere, it is sealed and stored at each appropriate amount in an air-tight bag to avoid the re-expansion.

Next, a netted bag 16 with an approximate shape of the internal space 15 is inserted into the above-mentioned internal space 15 from a hole 13a of the above-mentioned plate material

13. At that time, an injection port (not shown in the figure)/4 of the netted bag 16 is protruded to the outside from the above-mentioned hole 13a.

As mentioned above, an injection nozzle 17a of a filling machine 17 is inserted into the above-mentioned hole 13a, and said injection nozzle 17a is inserted into the injection port of the netted bag 16 in the internal space 15, so that the particle-shaped contracting body is injected.

After finishing the injection, the above-mentioned injection nozzle 17a is pulled out, and the injection port of the netted bag 16 is blocked by a locker such as clip or string and held in a normal-temperature air.

The particle-shaped foaming contracting body injected and held as mentioned above exhibits a foaming magnitude of 95 times for about 30 min, and the filling of the foaming body is completed in this manner. Therefore, since the quantity of the particle-shaped foaming contracting body being injected during the above-mentioned process is automatically determined by the relation with the volume of the above-mentioned internal space 15, the foaming body is injected as much as the quantity determined.

In the above-mentioned application example, as unique effects, the performances of the foaming particle-shaped

contracting body made of a styrene-acrylonitrile resin are compared with those of a urethane foaming raw agent and shown in the following table.

Table

表			
	発泡倍率	原料単価	設備費用
ウレタン発泡原液	2 ~ 20 倍	500 円/kg	注入機 約 2,000 万円
スチレン-アクリロニトリル 樹脂発泡粒状収縮体	約 100 倍		充填機 約 20 万円

1. Foaming magnitude
2. Raw material unit price
3. Facility cost
4. Urethane foaming raw liquid
5. Foaming particle-shaped contracting body of styrene-acrylonitrile resin
6. 2-20 times
7. 500 yen/kg
8. Injection machine, about 20,000,000 yen
9. About 100 times
10. Filling machine, about 200,000 yen

As seen from the above table, in this application example, at any foaming magnitude and facility cost, this method is superior to the method for filling a urethane foam, and in particular, the facility cost can be reduced.

(Effects of the invention)

As explained above in detail, according to the method for filling a foaming body of the present invention, the following effects are exerted.

First, foaming synthetic resin particles or a foaming synthetic resin particle-shaped contracting body is supplied into the internal space of a structure, and the foaming body is filled by foaming. Thus, a foaming foam is not exuded from an opening part or gaps of the structure to be filled with a liquid foaming raw agent, or the surrounding is not contaminated. Thereby, the beautiful appearance of the structure to be filled can be maintained, and there is also no need of posttreatments.

Also, since the foaming synthetic resin particles or a foaming synthetic resin particle-shaped contracting body are expanded or re-expanded in a normal-temperature atmosphere, an apparatus for supplying it has a simple constitution, and no

place for the apparatus is adopted. Thus, a work space can also be easily secured.

Furthermore, since the foaming synthetic resin particles or a foaming synthetic resin particle-shaped contracting body are easily controlled and handled, the work contents are simple, and a work does not skills. Thus, the human cost is reduced, and the workability can also be improved.

4. Brief description of the figures

Figure 1 is an oblique view for explaining an application example of the method for filling a foaming body of the present invention. Figure 2 is an oblique view showing an example of a conventional method for filling a foaming body.

11 Center pillar (structure)

15 Internal space

16 Netted bag

17 Filling machine

17a Injection nozzle

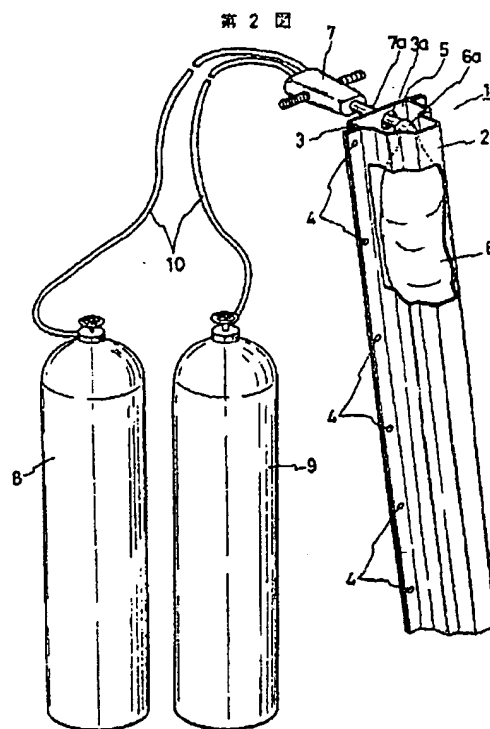
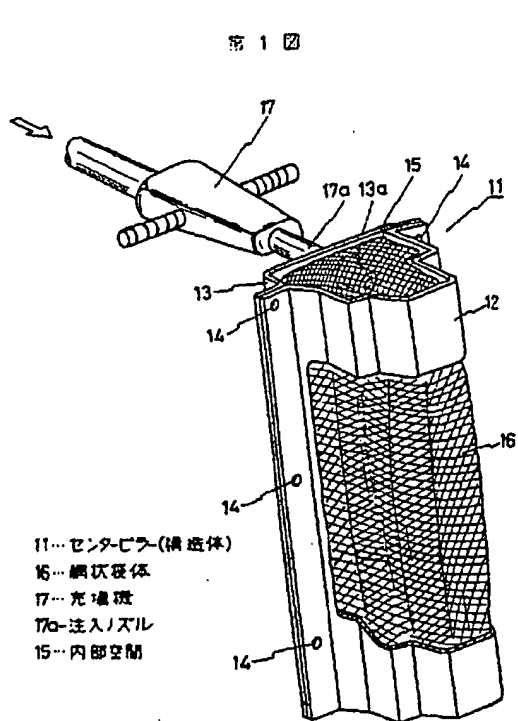


Figure 1:

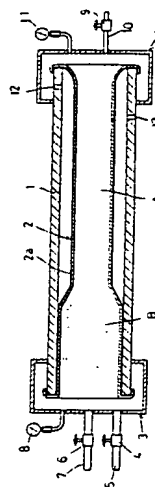
- 11 Center pillar (structure)
- 15 Internal space
- 16 Netted bag
- 17 Filling machine
- 17a Injection nozzle

(54) COATING METHOD FOR INSIDE OF TUBE

(11) 61-205117 (A) (43) 11.9.1986 (19) JP
 (21) Appl. No. 60-47281 (22) 8.3.1985
 (71) SUMITOMO ELECTRIC IND LTD (72) AIJI IWAMOTO
 (51) Int. Cl. B29C63/34//B29L23:22

PURPOSE: To enable to adhere reliably a tube pulled into a tube to the inside of the tube without causing accumulation of air between the tube and a tube wall, by substituting gradually steam introduced through one end side of the tube for the air to be discharged through the other end side of the tube under a pressurized state.

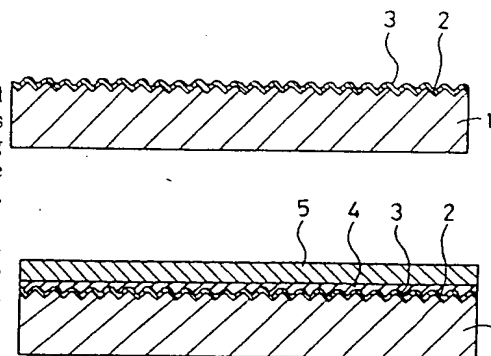
CONSTITUTION: Air A whose pressure is low to such an extent as to enable to inflate a tube 2 into a circular cross section is enclosed into the tube 2, to begin with, and then steam is sent into the tube through an inlet 7 by opening a valve 6 while the pressure is being kept on. The air A is discharged slowly while the pressure, through which an information state of the tube can be kept on, is being kept on by opening a valve 9. When steam B is substituted for the air A like this, the steam in the inside of the tube advances to an outlet side gradually as the steam is interrupted by the low-pressure air. Heating also of the tube progresses slowly from an inlet side of the steam, the tube is inflated in order from an inlet side wherein mechanical strength has been deteriorated due to softening of the tube and adheres closely to a wall of the tube even if the pressure in the inside of the tube is kept balanced and the air which has sojourned between the wall of the tube and the tube is discharged without being left behind.

**(54) CONNECTING METHOD OF RIGID PLASTIC**

(11) 61-205118 (A) (43) 11.9.1986 (19) JP
 (21) Appl. No. 60-46230 (22) 8.3.1985
 (71) TOSHINORI KOBARI (72) TOSHINORI KOBARI
 (51) Int. Cl. B29C65/48,C08J5/12

PURPOSE: To enable to strongly connects a connecting member on the flat and smooth surface of a rigid plastic, by a method wherein an uneven surface is formed on the connecting surface of the rigid plastic, and foundation treating agent which is mainly composed of polyolefin chloride series and vinyl chloride series is thinly coated and dried, and polyurethane series adhesive is painted, and the connecting member is adhered before it is dried.

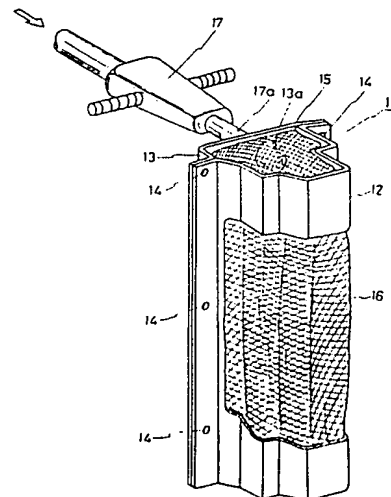
CONSTITUTION: The connecting surface of the rigid plastic member is polished and an uneven surface is formed. Subsequently, foundation treating agent 3 is thinly coated so as the uneven surface remains and is dried. Foundation treating agent is mainly composed by mixing polyolefin chloride series and vinyl chloride series resin. Next, polyurethane series adhesive 4 is coated so as the uneven surface is buried. After this, the connecting member 5 is adhered before the adhesive 4 is completely dried, desirably at about 80% semi-dried condition.

**(54) FILLING METHOD OF FOAMING BODY**

(11) 61-205119 (A) (43) 11.9.1986 (19) JP
 (21) Appl. No. 60-45167 (22) 7.3.1985
 (71) TOYOTA MOTOR CORP(1) (72) TAKAMI FUJISHITA(1)
 (51) Int. Cl. B29C67/22//B29C39/10,B29C39/24,B62D65/00,B29K105:04,B29L31:30

PURPOSE: To maintain the beauty of a construction body and to realize simplicity of the operation contents and improvement of workability of the filling operation, by a method wherein foaming synthetic resin particle type shrinking bodies are filled in the construction body and are made to foam leaving in the normal temperature atmosphere.

CONSTITUTION: Since foaming shrinking bodies which are composed of styrene acrylonitrile resin re-expand in the normal temperature atmosphere, these are preserved by enclosing in air-tight bags by adequate volumes to prevent re-expansion. A net type bag body 16 having nearly the same shape of this inner space 15 is inserted in the inner space 15 from a hole 13a of a plate member 13. A filling port of the bag body 16 is left outside of the hole 13a. Particle type constriction bodies are poured in by inserting a filling nozzle 17a to the hole 13a and filling port of the net type bag body 16. After the filling is finished, the filling nozzle 17a is pulled out, and the filling port of the net type bag body 16 is closed by a stopper and the bag is left in the normal temperature atmosphere. Particle type foaming constriction bodies which are filled and left, expand 95 times foaming magnifying rate in about 30min, and the filling of foaming bodies are completed. Accordingly, the volume of particle type foaming constriction bodies to be filled, are determined by the relation with the volume of the inner space 15.



PATENT ABSTRACT

Publication Number: 61-205119

Date of Publication: November 9, 1986

Application Number: 60-045167

Date of Filling: March 7, 1985

Applicant: Toyota Motor Corp.
Asahi Chen Ind. Co., Ltd.

Title: FILLING METHOD OF FOAMING BODY

Abstract:

Purpose: To maintain the beauty of a construction body and to realize simplicity of the operation contents and improvement of workability of the filling operation, by method wherein foaming synthetic resin particle type shrinking bodies are filled in the construction body and are made to foam leaving in the normal temperature atmosphere.

Constitution: Since foaming shrinking bodies which are composed of styrene acrylonitrile resin re-expand in the normal temperature atmosphere; these are preserved by enclosing in airtight bags by adequate volumes to prevent re-expansion. A net type bag body 16 having nearly the same shape of this inner space 15 is inserted in the inner space 15 from a hole 13a of a plate member 13. A filling port of the bag body 16 is left outside of the hole 13a. Particle type constriction bodies are poured in by inserting a filling nozzle 17a to the hole 13a and filling port of the net type bag body 16. After the filling is finished, the filling nozzle 17a is pulled out, and the filling port of the net type bag body 16 is closed by a stopper and the bag is left in the normal temperature atmosphere. Particle type foaming constriction bodies which are filled and left, expand 95 times foaming magnifying fate in about 30min, and the filling of foaming bodies are completed. Accordingly, the volume of particle type foaming constriction bodies to be filled, are determined by the relation with the volume of the inner space 15.

⑨ 日本国特許庁(JP)

⑩ 特許出願公開

⑪ 公開特許公報(A)

昭61-205119

⑫ Int. Cl.

識別記号

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4F

審査請求 有 発明の数 2 (全5頁)

⑭ 発明の名称 発泡体の充填方法

⑮ 特 願 昭60-45167

⑯ 出 願 昭60(1985)3月7日

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明 細 書

1. 発明の名称

発泡体の充填方法

2. 特許請求の範囲

- (1) 発泡性合成樹脂粒を構造体の内部空間に供給し発泡させることを特徴とする発泡体の充填方法。
- (2) 発泡性合成樹脂粒が常温大気中で膨張するものである特許請求の範囲第1項記載の発泡体の充填方法。
- (3) 発泡した後収縮し、さらに常温大気中にて再膨張特性を有する発泡性合成樹脂粒状収縮体を構造体の内部空間に供給し発泡させることを特徴とする発泡体の充填方法。
- (4) 発泡性合成樹脂粒状収縮体を製造して気密状態で保存しておき、発泡体を充填すべき構造体の内部空間の形状に対応する形状で、かつ、前記粒状収縮体の粒径より細かい目を有する網状袋体を予め前記空間内に配置した後、前記網状袋体に前記粒状収縮体を供給し、しかる後に

常温大気中に放置して前記粒状収縮体を再膨張させることを特徴とする特許請求の範囲第3項記載の発泡体の充填方法。

3. 発明の詳細な説明

(産業上の利用分野)

本発明はビーズ発泡が可能な固体樹脂材料を、構造体の内部空間へ発泡充填する方法に関するものである。

(従来の技術)

一般に、自動車のボデー等の構造体の内部空間、例えば、ビラー、ルーフ、ロッカー、ホイールハウス等の内部に騒音の低下や振動の吸収等の目的で発泡体を充填することが行なわれている。このような発泡体充填方法としては、予め別工程で発泡成形したスラブウレタンフォーム等の発泡体を構造体の内部空間に充填する方法と、粒状発泡性材料を構造体の内部空間に注入して発泡させる方法とがあげられる。前者の方法は、別工程で成形した発泡体の形状と構造体の内部形状とを一致させることが困難であり、

発泡体と構造体の間に間隙が生じ、防音、防振効果が低下する問題点がある。後者の方法では、液状発泡性材料を注入して現場発泡させる場合、構造体、例えば自動車ボデーのビラー部分のスポット溶接をしていない部分の間隙や配線用穴或いは電着塗料抜穴等から液状発泡性材料が漏出するため、予め発泡の際の空気が逃げる部分を残して他の隙間をシールする必要がある、作業能率が低下する問題点がある。

このような問題点を解決するため、第2図に示すような発泡体の充填方法(特開昭59-214628号公報参照)が提案されている。この方法は、構造部材1、例えばプレス成形加工等により折曲された2枚の板材2、3をスポット溶接4により張り合せて一体成形した自動車のセンタービラーの内部空間5に、伸縮性を有するゴム等の袋体6をまず、挿入しておく。次に、前記板材3に穿設された孔3aより発泡原液を注入する注入機7の射出ノズル7aを挿入して、前記袋体6の庄入口6aより所定量の発

泡原液を注入する。

上記の動作により、袋体6内に注入された発泡原液は直ちに発泡してビラー等の構造部材1の内部空間5内に充填して空間形状にて固化するので、構造部材をシールする手間を労さずに簡単に充填を行なうこともできる。

尚、発泡体としてはポリウレタンフォームを代表例として挙げる事ができ、このポリウレタンフォームの成形方法としては、第2図のポンベ8に、ポリイソシアナート液を封入し、ポンベ9にポリオール、発泡剤、触媒、界面活性剤等の混合液を封入し、ポンベ8、9の両液をホース10、10により前記射出ノズル7aに導いて、この射出ノズル7aにおいて混合して射出している。

(発明が解決しようとする問題点)

しかしながら、上述した従来の発泡体の充填方法によれば、以下のような問題点を有していた。

まず、構造部材1の板材2、3の間隙や孔な

どからの発泡原液の漏出は防止できるが、板材3の孔3aより注入機7の射出ノズル7aを挿入して内部空間5内の袋体6に発泡原液を注入する際に、液体であるために射出ノズル7aからの原液の滴りによって車室内やビラー表面等を汚してしまうという問題点を有していた。

また、ポリウレタン等の発泡原液を袋体6に注入して発泡させるには、発泡直前にポリイソシアナート液と混合液とを混合させねばならず、このため注入機7、ポンベ8、9、ホース10等よりなる大型の装置が必要となり、これらを設備するために広い作業場を確保しなければならないという問題点もあった。

さらに、発泡原液の管理や取扱いについても、高圧下で保存し、しかも大気中での反応が過敏であるところから、機械的及び化学的知識を相当に必要としており、作業者が限定されるといふ問題点もあった。

本発明の目的は、液状発泡性材料のように構造体の外部へ漏出して周囲や近傍を汚すことの

ない粒状の発泡原液を用いて構造体の美観を維持すると共に、充填作業の作業内容の簡略化と作業性の向上とを實現することにある。

(問題点を解決するための手段)

上記目的を達成するための本発明に係る第1の発泡体の充填方法の特徴は、ポリウレタンフォーム等の液状発泡性材料を用いしないで、ビーズ発泡が可能な樹脂、例えばポリスチレン、ポリエチレン、ポリプロピレン等を構造体に充填し、一定の圧力を加えて水蒸気の加熱により発泡させることにある。

さらにより好ましくは、常温大気中にて膨張特性を有する発泡合成樹脂粒状収縮体を構造体に充填し、常温大気中に放置して発泡させることにある。

本発明に係る第2の発泡体の充填方法の特徴は、発泡した後収縮し、さらに常温大気中にて再膨張特性を有する発泡性合成樹脂粒状収縮体を構造体の内部空間に供給し発泡させるものであり、さらにより好ましくは、発泡合成樹脂粒

状収縮体を製造して気密状態で保存しておき、発泡体を充填すべき構造体の内部空間の形状に対応する形状で、かつ、前記粒状収縮体の粒徑より細かい目を有する網状袋体を予め前記空間内に配置した後、前記網状袋体に前記粒状収縮体を供給し、しかる後に常温大気中に放置して前記粒状収縮体を再膨張させることにある。

ここで発泡性合成樹脂粒及び発泡性合成樹脂粒状収縮体というのは粒のみを差すのではなく、球チップ等、構造体の空間内へ容易に供給できる大きさのものであれば、その形状を問わないものである。

(作用)

上記第1の発明において、発泡合成樹脂粒を構造体に供給するので、液状発泡性材料のようにゴム等の収縮性を有する袋体の洩出防止手段を講ずる必要なく、発泡性材料を構造体に供給できる。

上記第2の発明において、再膨張特性を有する発泡合成樹脂収縮体としてはアクリロニトリ

ルを清掃する労を省くためである。また、網状としたのは、上記発泡原剤は気密状態としてしまうと発泡しないので、大気に接触させる必要があるからである。従って、以上の2点から網状袋体の網目の大きさは、例えば上記発泡性AS樹脂粒子の場合には、50倍程度にまで収縮して気密保存している粒状収縮体の粒徑より小さくするものとする。

以上のような作用を有するので、本発明に係る発泡体の充填方法によれば、発泡体を充填すべき構造体の内部空間より発泡収縮体が漏出する虞れがなく、また、たとえ周囲に零したとしても液体状のもののように表面に付着したりしないので、美観の維持を図れる。また、常温大気中で再膨張するので、充填作業が簡単に行なえ、作業性の向上を図ることもできる。

(実施例)

上述した発泡体の充填方法についての具体的な実施例を以下説明する。

第1図は本発明の一実施例を説明する一部切

ル-スチレン共重合体樹脂(AS樹脂)100gr当りに揮発性有機発泡剤を0.15grモル含有せしめた発泡性合成樹脂粒子(例えば、特願昭59-215164号)が用いられる。この発泡性合成樹脂粒状収縮体を気密状態、例えばポリ塩化ビニリデン(PVDC)等の袋等に保存しておくのは、発泡性合成樹脂粒状収縮体が、水蒸気に接触して加熱されて発泡倍率200倍程度に発泡し、大気中に出すと50倍位にまで収縮して、そのまま大気中に放置すると直ちに再膨張を開始して再び200倍程度に発泡してしまうからである。

上記発泡粒子を粒状化するのは、粒状化することにより自動車のビラー等の構造体の内部空間で、均一な密度で発泡させるためである。

また、粒状の発泡収縮体を、予め構造体内部空間に配設した網状袋体に供給するのは、粒状発泡収縮体は従来の液体状のポリウレタン原剤等と異なり構造体の外部に零れて発泡しても表面等に付着することはないが、作業完了後に周

欠斜視図であり、本実施例では自動車のセンタービラーに発泡体を充填する場合を例にとっている。

同図において、自動車のセンタービラー11は、プレス成形等によって折曲形成された2枚の板材12,13をスポット溶接等の固着手段14により張合せて一体化している。このセンタービラー14の内側には内部空間15が形成されている。

上記構造のセンタービラー14に発泡体を充填する過程を説明する。

まず、粒状の発泡収縮体の製造については、特願昭59-215164号の実施例記載の製法に従い、スチレン-アクリロニトリル樹脂よりなる発泡収縮体を得た。この発泡収縮体は常温大気中にて再膨張するので、これを避けるために気密性の袋体に適量ずつ封入して保存しておく。

次に、前記内部空間15内に、略この内部空間15の形状を有する網状袋体16を、前記板材13の孔13aより挿入する。このとき網状

袋体16の注入口(図示されず)は前記孔13aより外部へ出しておくものとする。

上記のように網状袋体16を配設した後、前記孔13aに充填機17の注入ノズル17aを挿入し、内部空間15内の網状袋体16の注入口に該注入ノズル17aを挿入して粒状収縮体を注入する。

注入終了後、前記注入ノズル17aを引き抜き、網状袋体16の注入口をクリップ又は紐体等の止め具で塞いで常温の大気中に放置する。

上記のようにして注入、放置された粒状発泡収縮体は、約30分で9.5倍の発泡倍率を示し、このようにして発泡体の充填が完了する。従って、上記の工程で注入する粒状発泡収縮体の分量は前記内部空間15の容積との関係で自ずと決定されるので、この決定された分量だけ注入することになる。

上記実施例に特有の効果としてスチレン-アクリロニトリル樹脂発泡粒状収縮体の性能をウレタン発泡剤との比較の下に下表に示す。

	発泡倍率	原料単価	設備費用
ウレタン発泡原液	2~20倍	500円/kg	注入機 約2000万円
スチレン-アクリロニトリル樹脂発泡粒状収縮体	約100倍		充填機 約20万円

上表から明らかなように、本実施例では、発泡倍率、設備費用の何れをとっても、ウレタンフォームを充填する方法以上に優れており、特に設備コストを低減できるという特有の効果を奏する。

(発明の効果)

以上、詳細に説明したように、本発明に係る発泡体の充填方法によれば、以下の効果を有する。

まず、発泡性合成樹脂粒又は発泡性合成樹脂粒状収縮体を構造体の内部空間に供給し、前記のものを発泡させて発泡体の充填を行なうよう

にしたので、液体状の発泡剤のように充填すべき構造体の開口部又は隙間等から発泡フォームが食み出したり、周囲を汚したりすることがなく、充填対象となる構造体の美観を維持することができ、後処理の必要もない。

また、発泡性合成樹脂粒又は発泡性合成樹脂粒状収縮体を常温大気中に膨張又は再膨張するものにより構成したので、これらを供給する装置が簡単な構成で、しかも場所をとらなくて済み、作業スペースの確保が容易であるという効果も奏する。

さらに、発泡性合成樹脂粒又は発泡性合成樹脂粒状収縮体の管理、取扱いが容易であるので、作業内容が簡単であり、作業者が熟練を要しないことから、人的コストの低減と作業性の向上にも資することができる。

4. 図面の簡単な説明

第1図は本発明に係る発泡体の充填方法の一実施例を説明する斜視図、第2図は従来の発泡体の充填方法の一例を示す斜視図である。

11 … センターピラー(構造体)、15 … 内部空間、16 … 網状袋体、17 … 充填機、17a … 注入ノズル。

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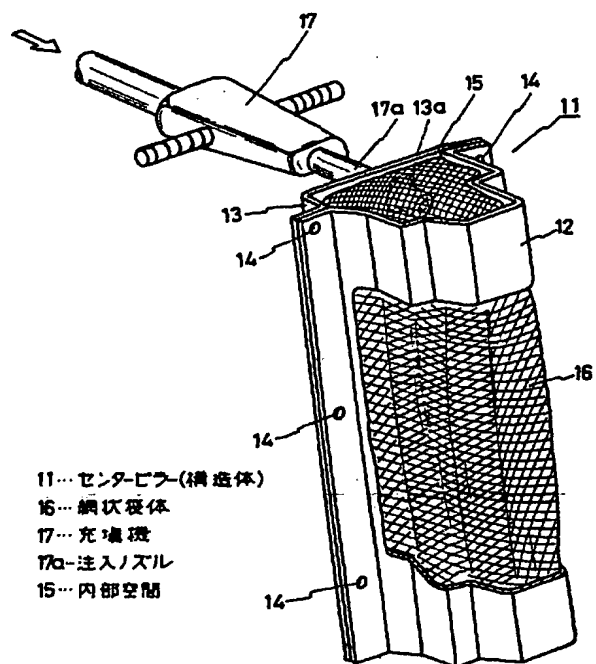
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第 1 図



第 2 図

